TO SUPPORT THIS EFFORT, ATTEND THE IHY PLANNING SESSION AT THE WORLD SPACE CONGRESS OCT 17, 2002 AT HOUSTON TX

International Heliophysical Year (IHY)

A Program of Global Research Continuing the Tradition of Previous International Years

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OVERVIEW

In 1957 a program of international research, inspired by the International Polar Years of 1882-83 and 1932-33, was organized as the International Geophysical Year (IGY) to study global phenomena of the Earth and geospace. The IGY involved about 60,000 scientists from 66 nations, working at thousands of stations, from pole to pole to obtain simultaneous, global observations on Earth and in space. There had never been anything like it before. The fiftieth anniversary of the International Geophysical Year will occur in 2007. We propose to organize an international program of scientific collaboration for this time period called the International Heliophysical Year (IHY). Like it predecessors, the IHY will focus on fundamental global questions of Earth science.

INTRODUCTION

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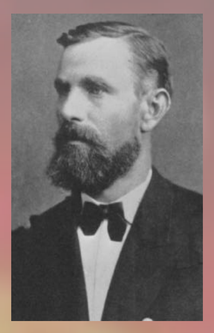
October 4, 1957, three months after the International Geophysical Year (IGY) began, Sputnik was launched. This was the beginning of the space age. Sputnik I and III and Explorer I along with numerous suborbital rocket flights contributed to the tremendous success of the IGY. Space science has made tremendous strides in the last 50 years. We now routinely monitor the Sun, the interplanetary medium, and the atmosphere of Earth from space. The IHY will provide a unique opportunity to coordinate observations from the current impressive fleet of international space missions, with data from solar ground based observatories ground based auroral observatories, neutron monitor observations, magnetic field observatories, ionospheric, meteorological, and other atmospheric observatories. Unprecedented, simultaneous observations with broad coverage of all associated solar, heliospheric, geospace, and atmospheric phenomena will be obtained. The resulting data will allow global studies of the complete Sun-Earth system.

HISTORY INTERNATIONAL YEARS



Lieutenant Karl Weyprecht first proposed the International Polar Year in 1875 after returning from an Arctic expedition

The First International Polar Year was the idea of an Austro-Hungarian Naval lieutenant Carl Weyprecht (de V. Heathcote, Neils H., Annals of the International Geophysical Year, 1, 1959). Weyprecht had just returned from a polar expedition where he commanded one of the research vessels. In January 1875 at the Academy of Sciences in Vienna, Weyprecht expressed his ideas to establish an international collaboration to obtain a set of simultaneous observations, extending over a considerable time period, at various locations around the Arctic. The concept was presented again in September 1875 at the 4th Meeting of the Association of German Naturalists and Physicists at Gratz. In 1877 a detailed program was prepared and submitted to the International Meteorological Congress. In 1879 the International Meteorological Congress met in Rome and recognized the importance of the proposal.

On October 1-5, 1879 the 1st International Polar Conference (IPC) met at Hamburg. It was determined that a minimum of eight arctic stations was needed, to obtain observations of at least one-year duration. The Conference also established the IPC with representatives from Austria, Hungary, Denmark, France, Germany, The Netherlands, Norway, Russia, and Sweden. Dr. G Neumayer of Hamburg was the first Commission president. In July 1880 the 2nd IPC met at Berne. There an Italian representative joined the existing representatives, and Prof. H. Wild became second president. On August 1, 1881 the 3rd IPC met at St Petersburg. The United States joined the group, and a program of observations was adopted. The First International Polar year began Aug 1, 1882 and continued for 13 months to Sep 1, 1883. Scientific results and observational data were published in the Bulletin of the International Polar Commission. In 1884 and 1891 the 4th and 5th Polar Conferences were convened. Weyprecht did not live to see the culmination of his grand concept. He died on March 29, 1881.

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In 1927 Dr. J Georgi at Deutsche Seewarte in Hamburg suggested that a **Second International Polar Year** be conducted on the fiftieth anniversary of the first (Laursen, V., Annals of the International Geophysical Year, 1, 1959, 211). A proposal was submitted to the International Meteorological Committee, and then forwarded to Reseau Mondial and Polar Meteorology. The Commission for the Polar Year 1932-1933 was appointed to prepare detailed plans for the observations to be made and the methods for making them. A collaboration was established between the Commission for the Polar Year and the International Union of Geodesy and Geophysics. At a meeting in Sep 1931 the Commission for the Polar Year, despite being urged to delay due to poor economic conditions worldwide, decided to go ahead the Polar Year program. On 1 Aug 1932 the Second International Polar Year began. It continued until 1 Sep 1933.

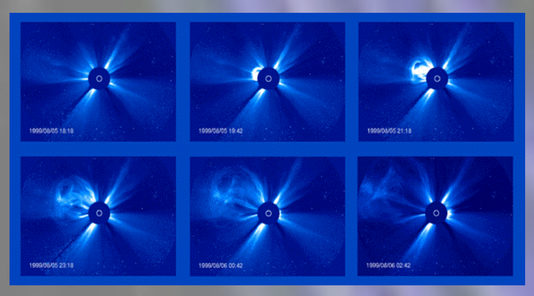


Image sequence showing a CME from SOHO/LASCO

In 1950, a proposal for the **International Geophysical Year**, 25 years after the Second Polar Year, was brought before the Mixed Commission on the Ionosphere, which endorsed it. The Mixed Commission on the Ionosphere was formed by the International Council of Scientific Unions (ICSU) under the sponsorship of the International Union for Scientific Radio (URSI) with the cooperation of the International Astronomical Union (IAU) and the International Union for Geodesy and Geophysics (IUGG). The IUGG drew up a tentative program, and adopted a resolution to transmit it to the International Council of Scientific Unions (ICSU), which sponsored the event. All bodies endorsed the proposal by 1951.

The IGY was a tremendous success. The newly developed space-flight capability was used to discover and explore Earth's radiation belts, to study the magnetosphere, and to provide the first observations of the emission from the Sun's corona. Public interest in the scientific results of the IGY was high. The IGY provided a forum and a backdrop for discussing the importance of geospace influences on Earth.

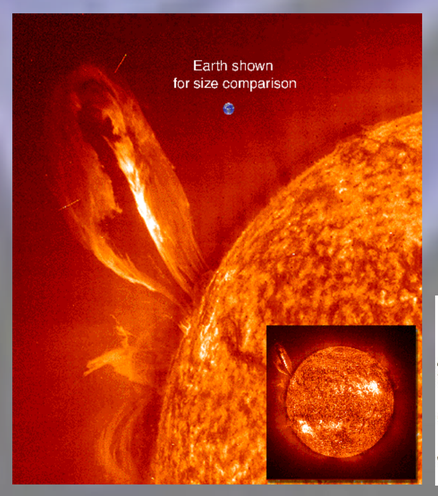
THE CASE FOR THE IHY

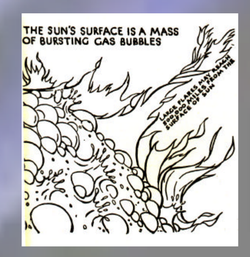
Like the IGY, and the two previous International Polar Years, the scientific objective of the **International Heliophysical Year** is to study phenomena on the largest possible scale with simultaneous observations from a broad array of instruments. However, unlike previous International Years, today observations are routinely received from a vast armada of sophisticated instruments in space that continuously monitor solar activity, the interplanetary medium, and the Earth (See Table). These spacecraft together with ground level observations and atmospheric probes could provide an extraordinary view of the Sun, the heliosphere, and their influence on the near-Earth environment. The IHY is a unique opportunity to study the coupled Sun-Earth system.

The recent explosion of interest in 'Space Weather' has excited the media and the general public, as well as many industrial colleagues, but it has also highlighted the fact that we know relatively little about the true Sun-Earth relationship. Thus, the IHY provides a method for satisfying the growing demands in this area.

Mission	Sponsoring Agency	Launch Date	Remarks
Solar and Heliospheric Observatory (SOHO)	ESA/NASA	1995	Full time solar observations from L1
Cluster	ESA	2000	Multipoint measurements of magnetospheric phenomena from 4 spacecraft formation
Solar Orbiter	ESA	2010	Imaging and spectral observations close to the Sun and out of the ecliptic
Solar Terrestrial Relationships Observatory (STEREO)	NASA	2005	Stereo view of solar events from two identical spacecraft in heliocentric orbit
High Energy Solar Spectroscopic Imager(HESSI)	NASA	2001	Imaged spectra of flare emission from the Sun
Advanced Composition Explorer (ACE)	NASA	1997	Particle distribution functions and composition, and magnetic field from L1
IMAGE	NASA	2000	Global imaging of Earth's magnetosphere
WIND	NASA/ESA	1994	Measurement of particle and fields in the IPM from L1
Solar Dynamics Observatory	NASA	2006	Active region formation from subsurface to corona, and irradiance measurements
Pioneer	NASA		Heliopause and outer heliosphere
Voyager 1 and 2	NASA		Heliopause and outer heliosphere
Solar-B	ISAS	2005	High resolution magnetograms of the Sun, coronal imaging and spectra
Triana	NASA	200x	Global Earth monitoring, and particle and magnetic field observations from L1

A partial list of space missions that could provide data relevant for the IHY. This list is incomplete, and represents only those missions readily known to the author(s). Part of the planning effort will be to complete and refine this list, and to arrange for collaborative observations as required.





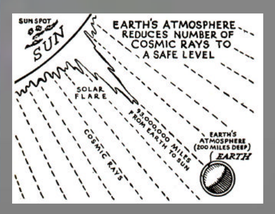


Image of the Sun in the 304 A emission line of He II from the Extreme-ultraviolet Imaging Telescope (EIT) showing an eruptive prominence, along with illustrations from IGY literature.

CURRENT ACTIVITIES

- Encourage IUGG, SCOSTEP and COSPAR to petition ICSU for a resolution declaring the year 2007 as the beginning of the IHY, and to establish a Multi-disciplinary Planning Commission for the IHY
- Seek the endorsement and participation of the space agencies of the world ESA, NASA, ISRO and ISAS.
- Arrange for a special session at the World Space Congress in Houston in October 2002 to discuss planning for the IHY.

CONCLUSION

The World Space Congress session at Houston will provide a forum for open discussion on the nature of the IHY. It will be used to form the basic IHY working plan. Additional sessions are planned after the World Space Congress to continue to develop the working plan. The 50th anniversary of the International Geophysical Year is a tremendous opportunity to advance our understanding of the Sun-Earth system, and to demonstrate the beauty, relevance, and significance of Earth science to the peoples of the World.

REFERENCES

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